

Work Order ID 72999

Tuesday, August 23, 2011 10:08:27 AM

<sup>PWA</sup>  
**U/R**



**F.A.L**

Page 1

Item ID: D350-748-101

Accept



Setup Start



Revision ID:

Stop



Item Name: Crosstube Installation, High Fwd

Start Date: 8/23/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 8/31/2011 Req'd Qty: 1.00



Customer:

Reference:

Approvals:

Process Plan:

Date: 1-08-23

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

Draw Nbr

Revision Nbr

D350-748-141

F

100



DOCUMENT CONTROL

DC

Memo

Document Control

Photocopy bluefile & type labels per PPPD350-748-101 CHG002

110



BENDING MACHINE - CROSSTUBES

0.00

CNC Bend 1

Memo

0.00

CNC Delta 100 Bender

Bend tube as per Dwg D350-748-141 using CNC bender program D350F and Folio FT

120



QC15- Crosstube Dimensional Check

0.00

QC

Memo

0.00

Quality Control

**SCRAP**

*[Handwritten signature]*

11-9-28

11-09-28

Dart Aerospace Ltd

W/O: 72999		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D350-748-101 PAR #: ✓/r Fault Category: x-tube NCR: Yes DQA: ✓ Date: 11.10.28  
 Resolution: use as-is Disposition: use as-is QA: N/C Closed Date:  

NCR: 11-916		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
11.09.28	110	Crushing after bending 15 6.5%. RC: <u>Mat Properties process</u>	<u>GP</u> 11.09.28 <u>P1042</u>	Acceptable	<u>n/a</u>	<u>✓</u> 11.09.28 <u>P51042</u>	<u>GP</u> 11.09.28 <u>P51042</u>	<u>✓</u> 11.09.28

NOTE: Date & initial all entries

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Cust Item ID:

Required Date: 8/31/2011 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals:

Process Plan:

Date:

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

125

0.00



HandFXtube

Memo

0.00

Hand Finishing Crosstubes

\*\*\*Stress relief\*\*\*

Heat treat crosstube as per QSI010 4.3

Temp: 375

Start time: 7h00

Finish time: 11h00

1 SAJ 11-09-27

127

QC6- Inspect dimensions to drawing

0.00



QC

Memo

0.00

Quality Control

8/11/09/27

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Cust Item ID:

Required Date: 8/31/2011 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan: \_\_\_\_\_

Date: \_\_\_\_\_

Tooling: \_\_\_\_\_

Date: \_\_\_\_\_

Stop



QC: \_\_\_\_\_

Date: \_\_\_\_\_

SPC (Y/N): \_\_\_\_\_

Date: \_\_\_\_\_

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130  Crosstubes	Crosstubes	0.00							
Crosstubes	Memo	0.00							
	1-Drill Tube as per Dwg D350-748-141 Using DT8876 A,B & C Drill Jigs, Set-up drill table as per QSI 010								
	2-Deburr								
	3-Engrave Part # and Batch # as per Dwg D350-748-141								
	4-Remove all marks from tube within limits of D350-748-141								
	5- Apply a light coat of LPS3 on the interior of tube Batch: <b>ml09956</b>								
140  QC	QC5- Inspect part completeness to step on W/O	0.00							
Quality Control	Memo	0.00							
	CHECK 10 DEG HOLES WITH DT8876E (EUROCOPTER CLAMP)								

SAD 11-07-28

SAD 11-09-30

Sulor32

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Process Plan:

Date:

Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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150

Outsource process-Cadplate per QSI017 4.1.9.1

0.00



Outsource3

Memo

0.00

Outsource process - Cad plate

Issue P/O: 15070  
Stress relief at 375° for 5 hours  
Magnetic Particle Inspect per ASTM E1444  
Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2  
Embrittle relief at 375° for 8 hours, Chromate Treat  
Possible Supplier: Southwest United Industries  
Ensure Certificate of Conformity is attached

11-09-30

160

Receive &amp; Inspect for Damage &amp; Mat'l Certs

0.00



Packaging

Memo

0.00

Packaging

Ensure certificate of conformity is attached

11.10.07

170

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

★ SEE W/O CHG ATTACHED

8/11/07

②

PTD

W/O: 12999		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D350-748-101 PAR #: N/A Fault Category: X-Feed NCR: Yes No DQA: 11 Date: 11-10-25  
 Resolution: Scrap Disposition: Scrap QA: N/C Closed Date: 11/10/25

NCR: 11-915		WORK ORDER NON-CONFORMANCE (NCR) # 2922.17						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
11-10-11	170	Tube has two cracks  Per D.S. the fault is undetermined	<u>11/10/19</u> <u>221042</u>	Scrap Identify as scrap and give to eng. <del>Identify as scrap</del>	<u>11-10-19</u>	<u>11/10/19</u>	<u>11/10/19</u> <u>221042</u>	<u>11-10-11</u>
		(Supplier, mat., our process) RC: Process. (for now)						

NOTE: Date &amp; initial all entries



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.10.07	161	LOAD TUBE TO 3500 <sup>1/2</sup> FOR 1 MINUTE. PER D.S. EMAIL	CP	11.10.07	1	CP 11.10.07 BS/042	
11.10.07	162	NDT tube PO 15121	CP	11-10-11	1	CP 11.10.07 BS/042	

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

## Chris Provencal

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**From:** David Shepherd <dshepherd@dartaero.com>  
**Sent:** Tuesday, April 27, 2010 3:40 PM  
**To:** 'Mike Petsche'  
**Cc:** 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com  
**Subject:** 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

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Reference:

Run Start



Approvals: Process Plan: Date: Tooling: Date:

Stop



QC: Date: SPC (Y/N): Date:

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180  SprayPaint Spray Painting	SprayPaint  Memo 1-Prime inside crosstube as per QSI 005 4.2 2-Prime Outside of Tube as per Dart QSI 005 4.2	0.00  0.00							
190  QC Quality Control	QC14- Inspect Spray Paint  Memo Then, Wrap in plastic bag to protect from scratches	0.00  0.00							
200  Crosstubes Crosstubes	Crosstubes  Memo 1-Install Ground wire Insert, then insert screw and washer 2-Install Abraison strips as per Dwg D350-748-141 & QSI 035. 3-Install supports Using Dt8876 as per Dwg D350-748-141, Torque to 60-80 IN-LBS	0.00  0.00							

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
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Customer:

Reference:

Run Start



Approvals: Process Plan:

Date:

Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

210

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

220

Pick Kit

0.00



Packaging

Memo

0.00

Packaging

230

QC4- 100% Inspect kits for completeness

0.00



QC

Memo

0.00

Quality Control

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Start Date: 8/23/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 8/31/2011 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals:

Process Plan:

Date:

Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
240		0.00							
	Packaging								
Packaging	Memo	0.00							
Packaging	Identify and pack for shipping as per PPP D350-748-101 Location: _____ PPP Rev: _____								
250		0.00							
	QC21- Final Inspection - Work Order Release								
QC	Memo	0.00							
Quality Control									

MF  
11-10-18

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

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# Picklist Print

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Tuesday, August 23, 2011 10:08:33 AM

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Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd





Start Date: 8/23/2011

Required Date: 8/31/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A New Issue 06-07-05 JLM  
 IPP Rev:B Update qty of MS21042L5 06-09-12 KJ  
 IPP Rev:C Rev B 07-11-15 DD  
 IPP Rev D Combined manufacturing 08.04.02 EC verified by: DD  
 IPP Rev:E 08-06-24 revD as per dwg DD verified by:EC IPP Rev:F  
 10.08.04 added QSI010 4.3 DD ver:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status																		
D350-748-141TRN		Manufactured	No			110	Each	0.0000	1	1																					
																															
Crosstube Turning Detail																															
ALS4-1032-225		Purchased	No			200	Each	931.0000	1	1																					
																															
Insert																															
<table><tr><th>Location</th><th>Loc Qty</th><th>Loc Code</th></tr><tr><td>ST282</td><td>931</td><td></td></tr><tr><td>110768</td><td>62</td><td></td></tr><tr><td>117717</td><td>9</td><td></td></tr><tr><td>118386</td><td>860</td><td></td></tr></table>														Location	Loc Qty	Loc Code	ST282	931		110768	62		117717	9		118386	860				
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ST282	931																														
110768	62																														
117717	9																														
118386	860																														
AN960JD10	NAS1149D0363J	Purchased	No			200	Each	0.0000	1	1																					
																															
Washer																															
D2856-400		Manufactured	No			200	f	266.7845	1.181	1.243158																					
																															
Abraison Strip																															
<table><tr><th>Location</th><th>Loc Qty</th><th>Loc Code</th></tr><tr><td>ST403</td><td>50.1149</td><td></td></tr><tr><td>68076</td><td>50.1149</td><td></td></tr><tr><td>ST409</td><td>216.6696</td><td></td></tr><tr><td>63735</td><td>0.6696</td><td></td></tr><tr><td>71164</td><td>216</td><td></td></tr></table>														Location	Loc Qty	Loc Code	ST403	50.1149		68076	50.1149		ST409	216.6696		63735	0.6696		71164	216	
Location	Loc Qty	Loc Code																													
ST403	50.1149																														
68076	50.1149																														
ST409	216.6696																														
63735	0.6696																														
71164	216																														

B72335

SAD

11-69-27

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Start Date: 8/23/2011

Required Date: 8/31/2011

Start Qty: 1.00

Required Qty: 1.00

D3502-1 Manufactured No

200

Each

25.0000

2

2



Support

Location

Loc Qty

Loc Code

ST063

25

61206

12

61843

3

64004

10

MS21920-20 Purchased No

200

Each

102.0000

2

2



Clamp (per MIL-DTL-8783C)

Location

Loc Qty

Loc Code

LG050

102

116799

10

118236

42

118649

50

MS27039-1-10 Purchased No

200

Each

299.0000

1

1



Screw

Location

Loc Qty

Loc Code

ST290

99

117441

99

ST291

200

118612

200

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Start Date: 8/23/2011

Required Date: 8/31/2011

Start Qty: 1.00

Required Qty: 1.00

AN4-41A

Purchased

No

220

Each

299.0000

8

8



Bolt

Location

Loc Qty

Loc Code

ST360

299

115108

74

115705

50

116191

50

117619

50

117795

25

118451

50

AN4-6A

Purchased

No

220

Each

1,184.000

16

16



Bolt

Location

Loc Qty

Loc Code

ST356

984

116924

84

117872

200

118422

300

118628

400

ST358

200

117514

200

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Shop Packet Print

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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Start Date: 8/23/2011

Required Date: 8/31/2011

Start Qty: 1.00

Required Qty: 1.00

AN5-32A Purchased No 220 Each 222.0000 4 4



Bolt

Location	Loc Qty	Loc Code
ST339	50	
118628	50	
ST340	172	
117161	1	
117514	11	
117872	60	
118191	50	
118422	50	

AN960JD416 NAS1149D0463J Purchased No 220 Each 0.0000 32 32



Washer

AN960JD516 NAS1149D0563J Purchased No 220 Each 0.0000 8 8



Washer

D3500-1 Manufactured No 220 Each 32.0000 4 4



Saddle

Location	Loc Qty	Loc Code
ST424	9	
66127	9	
ST424/25	20	
62207	20	
ST425	3	
61838	3	

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Shop Packet Print

Page 4

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



# Picklist Print

Tuesday, August 23, 2011 10:08:33 AM

Page 5

Work Order ID: 72999

Parent Item: D350-748-101

Parent Item Name: Crosstube Installation, High Fwd

Start Date: 8/23/2011

Required Date: 8/31/2011

Start Qty: 1.00

Required Qty: 1.00

D3501-1 Manufactured No

220 Each

321.0000 16 16



Bushing



Location

Loc Qty

Loc Code

ST063

221

61984

19

68939

102

70682

100

ST066

100

67757

100

MS21042L4 Purchased No

220 Each

4,639.000 24 24



Nut



Location

Loc Qty

Loc Code

ST300

4639

117441

494

117601

645

117885

1500

118451

2000

MS21042L5 Purchased No

220 Each

1,185.000 4 4



Nut



Location

Loc Qty

Loc Code

ST300

1185

116105

5

116548

53

117441

498

117591

43

117611

90

118179

496

Tuesday, August 23, 2011 10:08:33 AM

Shop Packet Print

Page 5

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

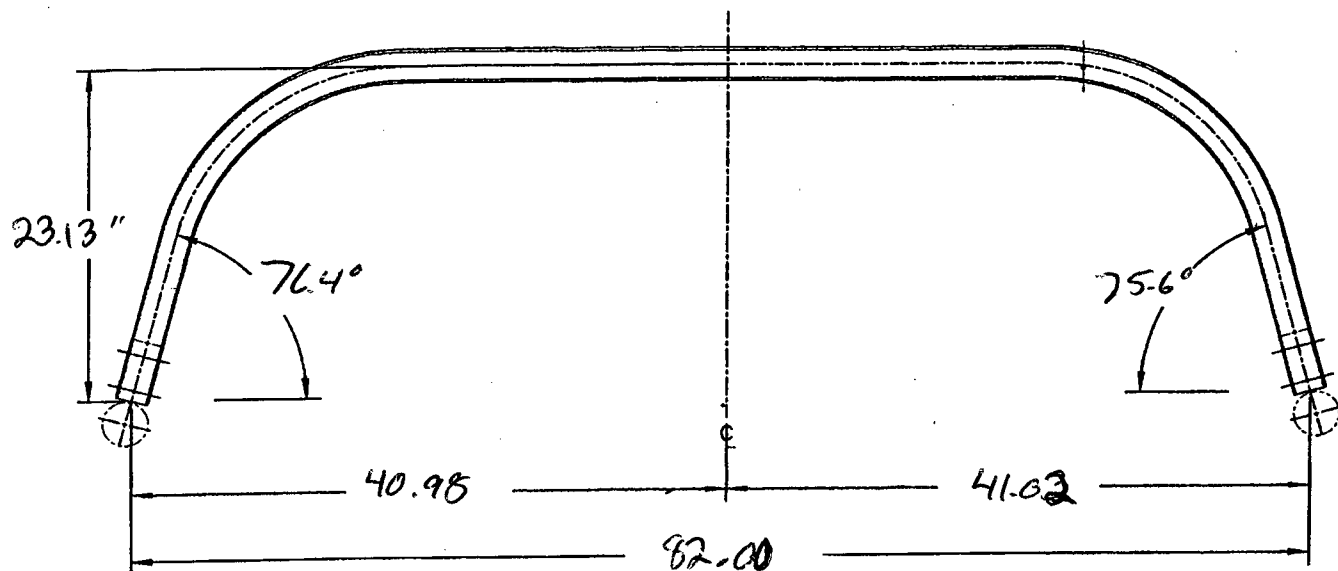
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

DART AEROSPACE LTD		Work Order:	72997
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04



Comments	
(A) 42 pieces 050 twist	(B) 40 pieces
6.58% crushing	

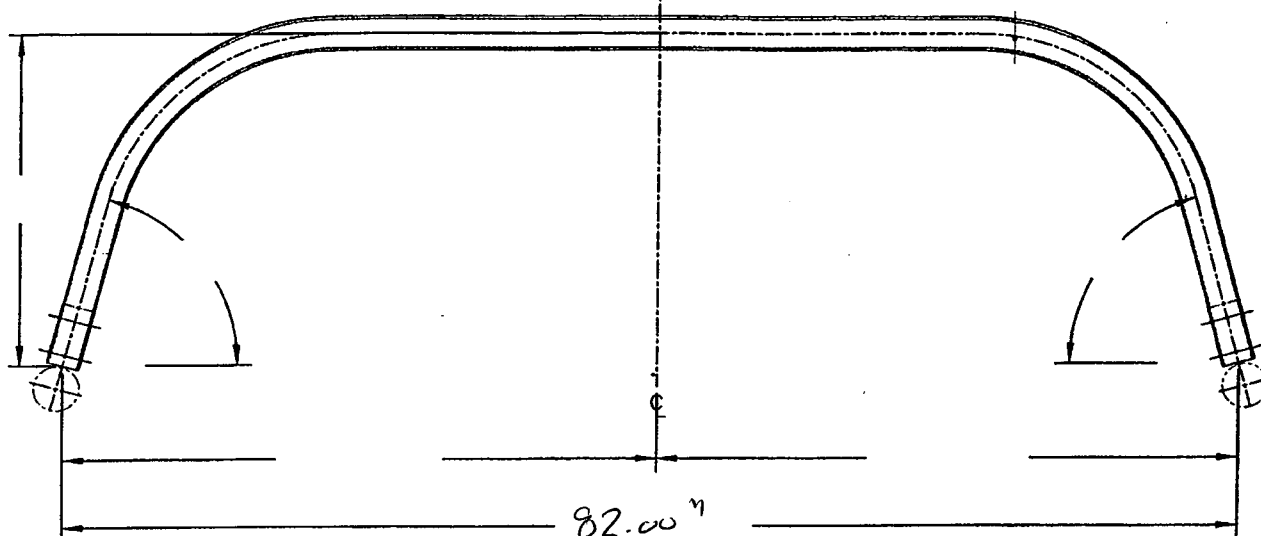
QC15 Inspection	<i>[Signature]</i>
Date	11-09-28

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	<i>[Signature]</i>

DART AEROSPACE LTD		Work Order:	72899
Description: Crosstube High Fwd (AS350/355)		Part Number:	D350-748-101
Inspection Dwg: D350-748-141 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	23.13	23.37
1/2 Span	40.78	41.02
Angle	75	77
Total Span	81.56	82.04

For stress relief only



Comments
twist - 0.154

QC15 Inspection	8
Date	10/08/23

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

10/08/23



Item	Qty -141	Part Number	Description
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6015-125	CROSSTUBE (OR D6017-115)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

#### GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6017-115  
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF  
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.  
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO  
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO  
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,  
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE  
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,  
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.  
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE  
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO  
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN.-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT  
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN  
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 72299

UNDER REVIEW

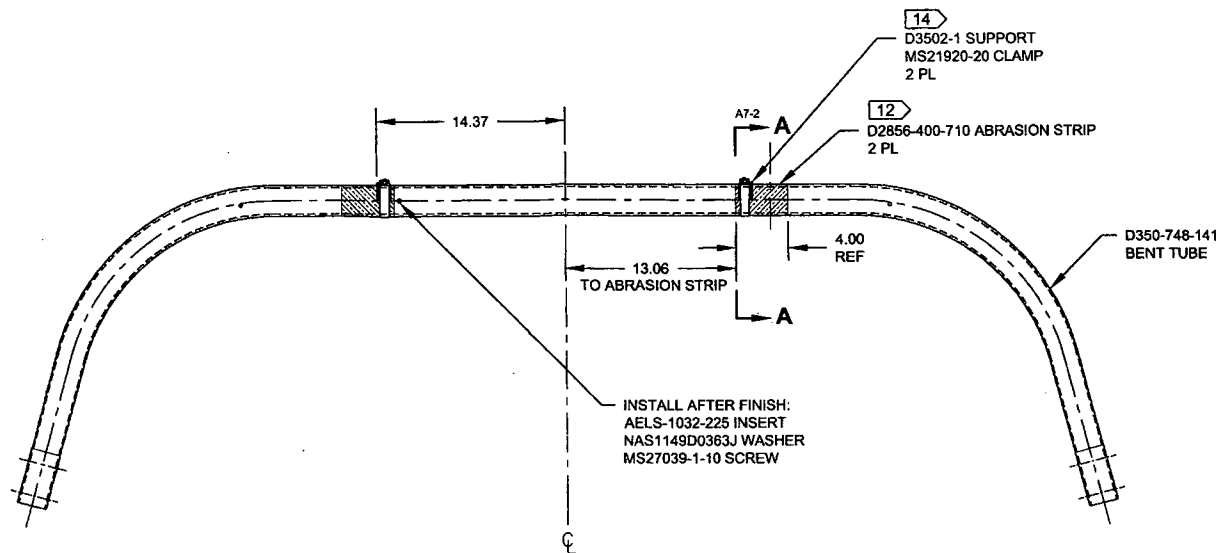
RELEASED  
2011-01-18

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 09-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN			
DRAWN			
CHECKED			
MFG. APPR.			
APPROVED			
DE APPR.			
DATE	10.11.23		

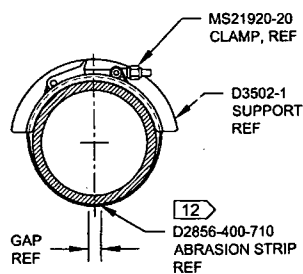
**DART AEROSPACE LTD**  
HAWKESBURY, ONTARIO, CANADA

DRAWING NO. REV. F  
D350-748-141 SHEET 1 OF 4  
TITLE SCALE  
CROSSTUBE (AS 350/355 HI FWD) NTS

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**D350-748-141  
ASSEMBLY DETAIL**









**SECTION A-A** D4-2  
SCALE 4X

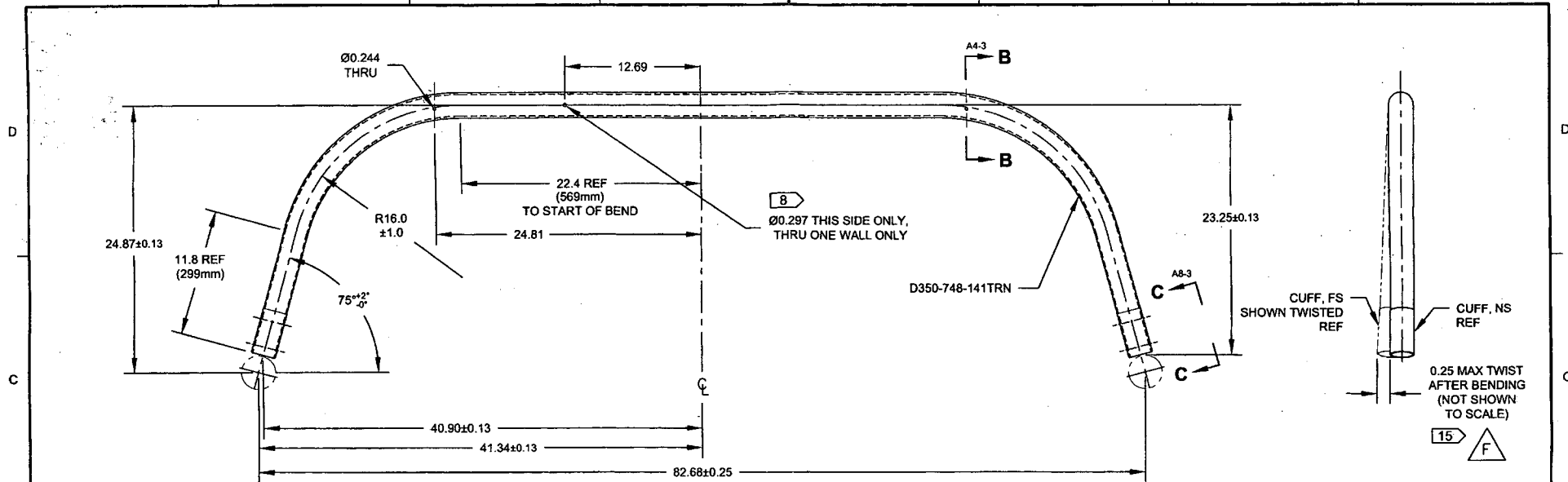
UNDER REVIEW

11.02.11

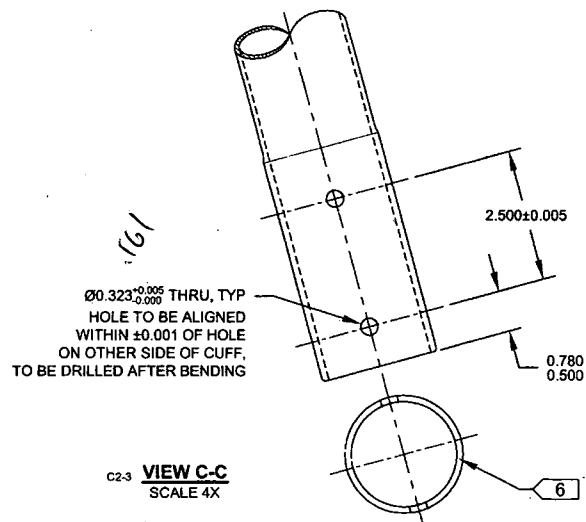
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2011-01-18

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CHECKED		DRAWING NO.	REV. F
MFG. APPR.		D350-748-141	SHEET 2 OF 4
APPROVED		TITLE	SCALE
DE APPR.		CROSSTUBE (AS 350/355 HI FWD)	NTS
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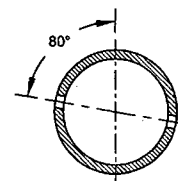
8 7 6 5 4 3 2 1



**D350-748-141**  
**BENDING AND DRILLING DETAIL** 10



C2-3 **VIEW C-C**  
SCALE 4X



**SECTION B-B** D3-3  
SCALE 4X

72009

UNDER REVIEW  
11.27.12

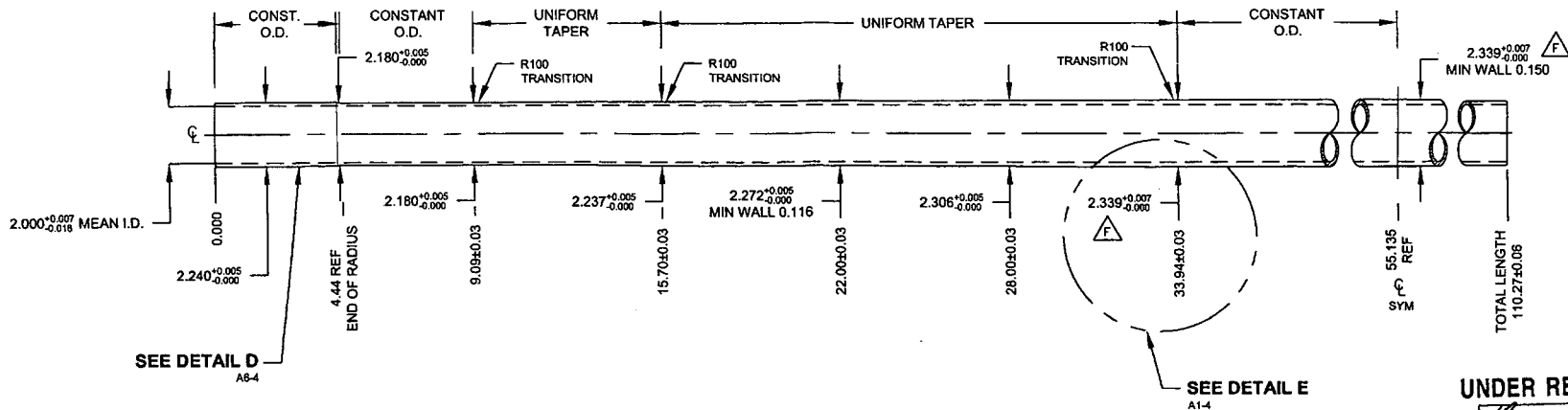
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2011-01-18

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CHECKED	B	DRAWING NO.	REV. F
MFG. APPR.	3	D350-748-141	SHEET 3 OF 4
APPROVED	4	TITLE	SCALE
DE APPR.	4	CROSSTUBE (AS 350/355 HI FWD)	NTS
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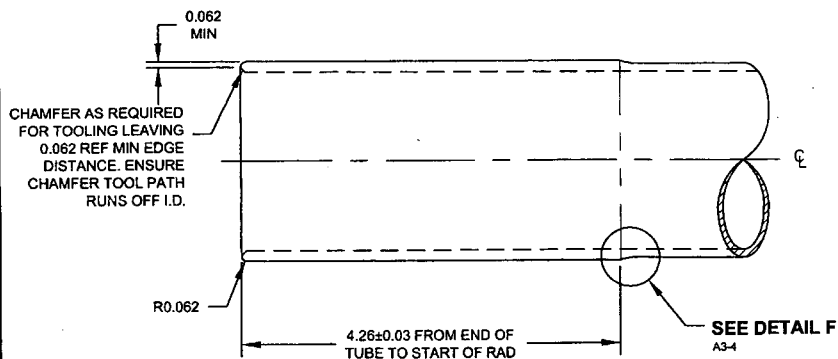
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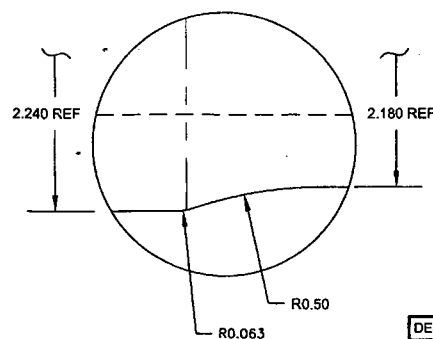
8 7 6 5 4 3 2 1



**D350-748-141TRN  
TURNING DETAIL**



**DETAIL D:  
CROSSTUBE CUFF** C7-4  
SCALE 3X



**DETAIL F:  
CUFF TRANSITION** A5-4  
NOT TO SCALE

**RELEASED**  
2011-01-18

**DETAIL E:  
TAPER RUN-OFF** C3-4  
NOT TO SCALE

DESIGN	40	<b>DART AEROSPACE LTD</b>	
DRAWN	40	HAWKESBURY, ONTARIO, CANADA	
CHECKED	40	DRAWING NO.	REV. F
MFG. APPR.	40	D350-748-141	SHEET 4 OF 4
APPROVED	40	TITLE	SCALE
DE APPR.	40	CROSSTUBE (AS 350/355 HI FWD)	NTS
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CERTIFICATE OF  
CONFORMANCE

CADORATH PLATING CO. LTD.  
2150 LOGAN AVENUE  
WINNIPEG, MANITOBA R2J-0J1

DATE: Oct-05-2011

CONSIGNEE TO: Dart Aerospace Ltd.  
1270 Aberdeen St.  
Hawksbury, ON K6A 1K7

W/O #: 108220  
INVOICE #: 57013

CONTRACT OR  
PURCHASE ORDER #

PO15070

DESCRIPTION: SKID

QTY 1

P/N # d350-748-101

S/N # B72999

STRESS RELIEF BAKE @ 375 DEG. FOR 5 HRS. MPI IAW ASTM-E-1444. CADMIUM PLATED IAW AMS-QQ-P-416C, TYPE 2 YELLOW, CLASS 1. HYDROGEN EMBRITTLEMENT BAKE @ 375 DEG. FOR 8 HRS. BAKE HEAT CHARTS #11-1036 & #11-1040.

*81110607*

CERTIFICATE: I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

Approved Inspector:



*[Handwritten signature]*

ACUREN

## Feuille de Temps Journalière

E-003427

Client : DART AEROSPACE # Travail : \_\_\_\_\_ Date : 2016-07  
 Contact : LINDA Jour : Dim Lun Mar Mer Jeu Ven Sam  
 Lieu de travail : 1270, ABERDEEN ST, HAWKESBURY, ONT. K6A1K7 # P.O. : 30 551 W.O. # : 188-11-02.370  
 Description : FPE ON X-TUBES # Véhicule : \_\_\_\_\_ Caméra # \_\_\_\_\_  
 # Rapport : P-12176

Nom	Spécialiste	Tech.	CEDO	Assistant	Heure début		Heures		Heures totales					KM	SUB	REPAS	TLD NO.	LISTE DE SÉCURITÉ - RADIATIONS							Lecture journalière DLD	
									Voyagement	Rég.	OT	DT	SP					CONTRÔLE DE SÉCURITÉ								
																					V/C	V/E	V/D	B/I		C/V
DAVID PEPIN		✓				AM			7.5					170												
						PM																				
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						PM																				
						AM																				
						PM																				

Film : \_\_\_\_\_ pcs. 3 1/2" - 4 1/2" X 17"

Consomables : \_\_\_\_\_

\_\_\_\_\_ pcs. 14" x 17"

\_\_\_\_\_ pcs.

Équipement : \_\_\_\_\_

Représentant Client : X

Eric Dourin 11/09/07

Cochez la case appropriée à la liste de sécurité-radiation

V/C VÉRIFICATION CAMÉRA  
 V/E VÉRIFICATION ÉQUIPEMENT SÉCURITÉ  
 V/D VÉRIFICATION AVEC DÉTECTEUR DE RADIATION  
 B/I BARRIÈRE & PANNEAUX INSTALLÉS  
 C/V CAMÉRA VERROUILLÉE & ENTREPOSÉE SÉCURITAIREMENT  
 C/S CAMÉRA SONDÉE APRÈS CHAQUE UTILISATION

NOTES : WAITING TIME (3 1/2 HOURS)pieces WAS NOT ARRIVED

## ACUREN

Jonquière	(418) 542-8273 • Téléc.: (418) 542-5494	Saint John	(506) 847-0194 • Téléc.: (506) 847-0194
Val-d'Or	(819) 354-9030 • Téléc.: (819) 825-9564	Oakville	(905) 825-8595 • Téléc.: (905) 825-8598
Gaspé	(418) 392-3618 • Téléc.: (418) 392-4114	Sudbury	(705) 522-1849 • Téléc.: (705) 522-9926
Montréal	(514) 207-9226	Cambridge	(519) 622-3112 • Téléc.: (519) 622-1326
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Sherbrooke	(819) 620-5456 • Téléc.: (819) 346-6828	Sarnia	(519) 336-3021 • Téléc.: (519) 336-8220
Halifax	(902) 497-3870 • Téléc.: (902) 445-5090	Thunder Bay	(807) 475-4240 • Téléc.: (807) 577-2017



P. 12176

PAGE 1 DE 1

CLIENT	<u>DART AEROSPACE</u>	DATE	<u>2011-10-07</u>	HEURE	<input type="checkbox"/> AM <input checked="" type="checkbox"/> PM
ATTENTION	<u>LINDA</u>	N° TRAVAIL	<u>188-11-02370</u>		
ADRESSE	<u>1270 ABERDEEN ST</u>	ACUREN	<u>188-11-02370</u>		
	<u>HAWKESBURY, ont. K6A 1K7</u>	N° CLIENT PO/WO	<u>30551</u>		
PROJET	<u>30551</u>	SITE DE TRAVAIL	<u>SHOP</u>		
ITEM(S) EXAMINÉ	<u>CROSSFUBE D 350-748-101 ; <del>72997</del> -</u>	ACCEPTATION STD.	<u>ASTM E1417-09</u>	DATE/RÉV.	<u>09</u>
	<u>ID 66923 ; 72999 ; 72997 ; 72998</u>		<u>(NO CRACK)</u>		

DESCRIPTION DES TRAVAUX		N° PROCÉDURE	LT- <del>ACT</del> <u>PT 01</u>	DATE/RÉV.	<u>2-0/0</u>	N° TECHNIQUE	LT- <del>X</del> <u>X 3</u> - XXX	DATE/RÉV.
N° ITEMS			MATÉRIEL				ÉPAISSEUR	
DESCRIPTION	<u>FPI ON 4 X-TUBES 100% OF EXTERNAL SURFACE</u>							

MÉTHODE : <input checked="" type="checkbox"/> FLUORESCENT	<input type="checkbox"/> VISIBLE	<input checked="" type="checkbox"/> LAVABLE À L'EAU	<input type="checkbox"/> MÉTHODE DISSOLVANT	<input type="checkbox"/> PRÉ-ÉMULSIONNANT
MARQUE : <b>MAGNAFLUX</b>	BATCH : <b>10C.072</b>	LUM. NOIRE S/N <b>26529</b>	<input checked="" type="checkbox"/> P. UISS. > 1 000 µ W/cm²	<input checked="" type="checkbox"/> AMBIANT < 2 fc
PENÉTRANT : <b>Zygo z167</b>	TEMPS PÉNÉTRATION MIN. 10	MIN.	ÉQUIP. LUMIÈRE <input checked="" type="checkbox"/> LAMP. POCHE	<input type="checkbox"/> LAMP. CULASSE
DISSOLVANT PÉNÉTRANT	TEMPS SÉCHAGE MIN. >10	MIN.	AUTRES	
RÉVÉLATEUR	TEMPS RÉVÉLATION MIN. 10	MIN.	MÈTRE LUM. N/S	DATE CAL DUE
TYPE RÉVÉLATEUR	<input type="checkbox"/> NON AQUEUX	<input type="checkbox"/> AQUEUX	<input type="checkbox"/> SEC	

CONDITION SURFACE	<input type="checkbox"/> MEULÉE	<input type="checkbox"/> SOUDÉE	<input checked="" type="checkbox"/> MACHINÉE	<input type="checkbox"/> MRENAILLÉE	<input checked="" type="checkbox"/> MÉTAL PROPRE
TEMPÉRATURE SURFACE	<input type="checkbox"/> < - 4°C/20°F	<input checked="" type="checkbox"/> 4°C/20°F A 10° C/50°F		<input type="checkbox"/> 10°C/50°F A 52°C/125°F	<input type="checkbox"/> > 52°C/125°F

ITEM	COMMENTAIRES	ACCEPTÉ	REJETÉ
1	ID 72 998	✓	
2	ID 72 999		✓
3	ID 72 997		✓
4	ID 66 923	✓	

(CRACKS TRANSVERSE TO THE TUBE ON 2 SIDES)  
(CRACKS TRANSVERSE TO THE TUBE ON 1 SIDE)



### Étendue des Services

*L'entente selon laquelle le Groupe Acuren Inc. exécute les services ne concerne que les énoncés par écrit. En aucune circonstance ces services ne s'étendent au-delà de l'exécution des services demandés. Il est entendu que toutes les descriptions, les observations et les expressions d'opinions faites par Acuren reflètent les opinions ou les observations de l'entreprise fondées sur l'information et les hypothèses fournies par le propriétaire/opérateur, et elles ne constituent pas des déclarations ou des garanties ou ne peuvent être interprétées comme constituant. Le Groupe Acuren inc. n'assume aucune des responsabilités du propriétaire/opérateur, et le propriétaire/opérateur conserve la responsabilité entière des décisions prises en matière d'ingénierie, de fabrication, de réparation et d'usage à partir de l'information ou des données fournies par Acuren en rapport avec les services décrits dans les présentes ne peuvent excéder le coût des services rendus.*

### Norme de Diligence

*Dans l'exécution des services, le Groupe Acuren Inc. Applique le degré de diligence, le soin et la compétence normalement exercés dans des circonstances semblables par d'autres fournisseurs de ce type de services opérant dans la même localité ou dans une localité similaire. Aucune autre garantie, implicite ou explicite, n'est faite ou voulue par le Groupe Acuren Inc.*

## SIGNATURES

REPRÉSENTANT					FIJ#:
TECHNICIEN (SIGNATURE):	MOULÉ		SIGNATURE		RAPPORT
NOM (MOULÉ):	DAVID PEPIN				RÉVISÉ PAR:
	1 <sup>er</sup> TECHNICIEN		2 <sup>nd</sup> TECHNICIEN		NOM.
	ONGC NIVEAU 2 SNT NIVEAU 2		ONGC NIVEAU _____ SNT NIVEAU _____		INITIALES
	ONGC N° REGISTRATION 11611		ONGC N° REGISTRATION		